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ABSTRACT

As part of an ongoing study of statistics anxiety, 37 students in the Master of Education program in a small, private liberal arts college completed a Likert-scale instrument asking them to rate from 1 ("not at all") to 5 ("a great deal") the extent to which 16 specific strategies reduced their statistics anxiety in the educational research classroom. Items were compiled from the answers of students in a previous study about how their instructors helped to reduce anxiety. Means and standard deviations were computed for each item. Ranking at the top for reducing anxiety was allowing tests to be "open book/open note," followed by working with a partner in the computer lab. The next five items were focused on instructor behavior and characteristics: positive attitude, encouragement, reassurance, recognition of anxiety, and humor. The use of rubrics, guidelines for completing and evaluating written and oral projects, ranked in the top half of items indicated by students as reducing their anxiety. Lowest in the rankings were doing work that was "real world" oriented, support of peers outside the class, and ability to get an "A" in the class. Working with a group in class and outside of class on a research project ranked just below the middle of the items but showed more variability than the other items. As the literature supports, cooperative learning can be both anxiety reducing and anxiety producing, depending on the composition of the group. (Author/SLD)

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Reducing Statistics Anxiety:

A Ranking of Sixteen Specific Strategies

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Abstract

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Abstract

As part of an ongoing study of statistics anxiety, 37 students in the master of education program in a small, private liberal arts college completed a Likert-scale instrument asking them to rate from 1 ("Not at all") to 5 ("A Great Deal") the extent to which 16 specific strategies reduced their statistics anxiety in the educational research classroom. Items were compiled from the answers of students to the question "What, if anything, did your instructor do to reduce anxiety in the statistics (or educational research) classroom?" in previous research conducted by the author.

Means and standard deviations were computed for each item. Ranking at the top for reducing anxiety was allowing tests to be "open book/open note," followed by working with a partner in the computer lab. The next five items were focused on instructor behavior and characteristics: positive attitude, encouragement, reassurance that "We can do it!," recognition of anxiety, and use of humor. The use of rubrics, guidelines for completing and evaluating written and oral projects, ranked in the top half of items indicated by students as reducing their anxiety. Lowest in the rankings were doing work that was "real world" oriented, support of peers outside class, and ability to get an "A" in the course.

Working with a group in class and outside of class on a research project ranked just below the middle of the items but showed more variability than the other items; as supported in the literature, cooperative learning can be both anxiety reducing and anxiety producing, depending on the composition of the group.

REDUCING STATISTICS ANXIETY:

A RANKING OF SIXTEEN STRATEGIES

Mathematics anxiety has been described as "panic, helplessness, paralysis, and mental disorganization that arises among some people when they are required to solve a mathematical problem" (Hunt, 1985, p. 32). This fear of mathematics generalizes to statistics and causes students in statistics classes and educational research classes, which often include the study of elementary applied statistics, to experience feelings of anxiety and incompetence. Sometimes students drop out of such courses, curtailing their career advancement (Richardson and Suinn, 1972); sometimes they just labor through the course, making it a high anxiety arena for their classmates and instructors.

By asking "What, if anything, did your instructor do to reduce anxiety in the statistics class," Wilson (1996, 1999) found that students perceive specific teaching behaviors and the interpersonal style of the instructor to be helpful in reducing stress in the educational research classroom. Effective teaching behaviors included having open book/open note tests, expressing concern about anxiety, working in cooperative groups, and using humor. Interpersonal factors included having a positive attitude and being encouraging, reassuring, supportive, and calm. The purpose of this research was to ask students to rate the effectiveness of specific strategies for reducing anxiety rather than responding to a more general, open-ended question.

Methodology

Participants

The participants were 37 students in the master of education program in a small, private

liberal arts college in southeastern Ohio. Included were 30 women and 7 men, with a mean age of 35. All were employed in elementary and secondary schools in the area. The average participant had taken math for elementary teachers and one other mathematics course, usually college algebra. For most of the students, this was the first or second course they had taken in the master of education program.

Procedures

A Likert-scale instrument was developed by analyzing student responses to the question, "What, if anything, did your instructor do to reduce anxiety in the statistics (or educational research) class?," collected from several classes of students over a three-year period. Similar responses were collapsed into single items, and sixteen items were selected, based on frequency of occurrence. The content validity of this instrument, then, relies on the quality of past student responses, which may have been influenced by the researcher's concerted attempt to alleviate anxiety by employing humor, acknowledging the anxiety, encouraging cooperative learning, emphasizing real world applications, and reducing the emphasis on testing. The reliability of the instrument, as measured by Cronbach's alpha, was 89.09.

The instrument was administered on the last day of class. Students were asked to circle from one to five (1=Not at All, 3=Some, 5=A Great Deal) the degree to which their anxiety was reduced by each item. Means and standard deviations for each item were calculated, and the items were ranked from highest to lowest.

Results

The results of the study are displayed in Table 1. Scores ranked from 4.95 for "Open book/Open note test" to 4.08 for "Easy to get an A."

Table 1

Mean Scores of Items from Likert Scale Instrument (N=37)

Item	N	M	SD
Open book/Open note test	37	4.95	0.23
Working with a partner in the computer lab	37	4.90	0.39
Instructor's positive attitude	37	4.81	0.46
Instructor's encouragement	37	4.78	0.42
Instructor's reassurance that "We can do it!"	37	4.78	0.42
Instructor's recognition of anxiety of students	37	4.68	0.47
Instructor's use of humor in the classroom	37	4.68	0.47
Guidelines (rubrics) provided for grades	37	4.62	0.59
Working with a partner on in-class assignments	37	4.54	0.69
Support of peers during class	37	4.51	0.69
Working with a group on a research project	37	4.38	0.98
Working with a group on in-class assignments	37	4.30	0.91
Doing a research project that is about a "real world" situation	37	4.27	0.73
Doing a research project designed to give me information about my own teaching situation	37	4.22	0.71
Support of peers outside of class	37	4.14	1.06
Easy to get an "A"	37	4.08	0.92

Discussion

An examination of the means reveals an obvious ceiling effect, with all means falling between 4 and 5. The possible reasons for these high numbers range from predisposition toward the instructor/researcher to the general--and desperate--notion that anything helps!

At the top of the list is "open book/open note test," an acknowledgment of the part testing plays in statistics anxiety. Second is "working with a partner in the computer lab," another stressful arena, especially for those unfamiliar with basic computer use.

The five next highest items all have to do with personal responses of the instructor, three with maintaining an encouraging demeanor and two with using specific strategies: humor and acknowledging student anxiety. It is apparent that the instructor's interpersonal style can have a great deal of influence in reducing the stress level of the students in his or her class.

Using real world applications may be a sound educational strategy, but it does less than other strategies to reduce stress. Both items referring to real world applications were near the bottom of the list.

It is interesting to note that the items having to do with cooperative learning, while overall perceived as effective in reducing stress, show greater variability than the other items. As other research has shown (DaRos & Onwuegbuzie, 1998, Wilson, 1999), cooperative learning can be stress *reducing* when the other group members are known and reliable and stress *producing* when the other group members are unknown—or known slackers.

Recommendations

If instructors are concerned about the level of anxiety in their educational research classrooms, they have the power to reduce anxiety in a number of ways. According to this study, among the best anxiety reducers, as perceived by students include the following:

1. Allow students to use their books and notes while taking tests. Since current pedagogy emphasizes the application of knowledge, rather than memorizing formulas and recalling factual information, this strategy should not lessen the "rigor" of the course and may, instead, force the instructor to ask higher-order questions and propose more stimulating problems than he or she would for a closed-book test.

2. Encourage students to work with partners in the computer lab, particularly if they are not proficient in computer use. To promote individual accountability, the instructor may require each student to turn in solved problems and analyses of data.

3. Convey positive expectations to all students—and then structure the work so that they do succeed. Most master's level educational research courses require that students learn very basic applied statistics: means, standard deviations, simple correlations, and simple analyses of variance. With structured learning activities that include clear instructions and well-chosen models to emulate, most students are capable of producing satisfactory work. Open-ended assignments encourage those students who are more capable to achieve a higher level of competence.

4. Permit groupwork but do not require it. If students choose to work in groups, allow them to choose their own groups. While being able to work with groups of strangers may be a valuable skill, it is not necessary that it be practiced in the already-stressful arena of the educational research classroom.

5. Acknowledge students' anxiety—and share with them your efforts to reduce it. With your help, they can move through their "panic" and "helplessness" to achieve at least a modest grasp of the statistics needed for beginning educational research.

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